in the form of chapters on selected subjects from eight of his British colleagues and one German investigator. All have worked in the field, and have authoritative things to say. All chapters are illustrated, some with photographs and electron micrographs, others with line drawings and graphs, still others with tables of biochemical data. All cite numerous references arranged conveniently in alphabetical order at the end of the book. The book is thus comprehensive and useful.

The editor provides introductory and final chapters that set the tone and summarize capably. He obviously has good taste and style, and his authors have either learned these good habits from him or have been preselected to fit the pattern. I know of no better recent compendium.

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Physical Chemistry of Water

Water. A Comprehensive Treatise. FELIX FRANKS, Ed. Plenum, New York, 1973. Vol. 1, The Physics and Physical Chemistry of Water. xx, 596 pp., illus. Vol. 2, Water in Crystalline Hydrates; Aqueous Solutions of Simple Nonelectrolytes. xx, 684 pp., illus. Vol. 3, Aqueous Solutions of Simple Electrolytes. xviii, 472 pp., illus. Each volume, $37.50; by subscription, $32.50.

Everybody knows that water is the most abundant compound on the earth's surface, the principal constituent of all living organisms and the perennially largest entry in the *Readers' Guide to Periodical Literature*. But it may be less well known that intensive study of its detailed physical properties dates only from about 1960. As a solvent and even as a pure liquid or solid, water is an exceedingly complex substance, and until quite recently scientists have tended to avoid coming to grips with its structural features on the microscopic level.

This three-volume treatise (a fourth volume, "Aqueous Solutions of Macromolecules; Disperse Systems," is nearing completion) is easily the most ambitious and extended treatment of this ubiquitous material. The only other general reference, *The Structure and Properties of Water* by Eisenberg and Kauzmann, is now superseded except for its chapter on the real vapor. Because most of the research is of relatively recent origin, the 33 chapters in these volumes are much like individual contributions in the *Annual Review of Physical Chemistry*. All the articles in which I read closely are of remarkably high quality, quite readable, and generally useful. On the other hand, it should be realized that there is continuing controversy about and evolution in numerous topics treated, and no claim is made that all viewpoints are included. What is needed, of course, is a review of the reviews, but that is probably impossible at this stage of development. However, Franks goes a long way in providing introduction, background, and overview. His three chapters ("Water, the unique chemical"; "The properties of ice"; "The solvent properties of water") are certainly one of the most attractive and unifying features of this encyclopedia.

The first volume is devoted to water as a pure substance and to spectroscopic studies: findings of Raman, infrared, nuclear magnetic resonance, x-ray, neutron diffraction, and acoustic studies are well treated, as are the dielectric, temperature, pressure, and transport properties. I found the four theoretical chapters—on the water molecule itself by Kern and Karplus, on hydrogen bonding by Rao, on the statistical mechanics of the liquid by Ben-Naim, and on structural models by Frank—particularly enjoyable and thorough. The other two volumes treat water mixed with other molecules: in crystalline hydrates and as aqueous solutions of electrolytes and nonelectrolytes. The topics and technical methods parallel those of the first volume, but now the complex systems that underpin so much of chemical research in other areas, industrial chemistry and biology, are involved. Partly because of my own participation in a very small part of the subject, the long chapter (a monograph in its own right) "Thermodynamics of ion hydration" by Friedman and Krishnan was especially interesting to me. The quantity of data and extent of analysis were far greater than I had known existed. As I noted at the beginning, all this is of fairly recent origin, and I suspect that many scientists working in areas peripheral to, yet basically dependent upon, these topics may find these volumes an important source of insight. It is obvious that this collection is central for workers in the immediate field. Two other books that complement volumes 2 and 3 are also worth noting: *Solvent Effects on Chemical Phenomena*, volume 1, by E. S. Amis and J. F. Hinton (Academic Press, 1973) and *The Hydrophobic Effect: Formation of Micelles and Biological Membranes* by Charles Tanford (Wiley, 1973).

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Resonance and Relaxation

Magnetic Resonance and Related Phenomena. Proceedings of a congress, Turku, Finland, Aug. 1972. V. HOVI, Ed. North-Holland, Amsterdam, 1973 (U.S. distributor, Elsevier, New York). xxxiv, 556 pp., illus. $47.50.

Magnetic resonance is both the subject of a discipline in its own right and a tool for the study of matter, and a conference devoted to it must deal with both of its faces. Viewing it as a form of spectroscopy, one could question its suitability as a conference topic; it is, one of the reviewer's colleagues has remarked, as if the voltmeter were the unifying theme of an international colloquium. The interplay between technical utility and intrinsic interest gives the lie to this irreverent attitude, however, and imparts vitality to the subject.

The 17th Congress Ampere continues the trend of these biennial meetings away from radio-frequency spectroscopy as a whole and toward the study of magnetic resonance and relaxation. Although no "conventional" high-resolution work was reported, the success of this technique as an analytical tool will lead many to ask if developments were presented of similar interest to a wide range of potential users. The most obvious candidate is high-resolution nuclear resonance in solids. It must be appreciated that in liquids high resolution is possible only because of the extreme narrowness of individual resonance lines; comparable linewidths in solids are difficult to obtain. Invited papers by J. S. Waugh and co-workers at MIT and E. R. Andrew at Nottingham describe two approaches to artificial line narrowing in solids and give insight into the progress made to date on this problem. It seems that at least for favorable cases a solution, with its attendant rewards, is in sight.